time, however, he has markedly improved; he looks better, has gained in weight, eats well, and breathes more freely. Doctor Crane and I are inclined to believe that the treatment helped him, even though the reaction was intense. A recent examination of blood smears, collected by the patient at night, and examined by Doctor Glenn, reveal no Filariae. Films made February 18 show some lowering of the fluid level in the general pleural cavity, although the mediastinal shadow remains as before. Films made April 2 and April 22 show lowering of the general pleural effusion and decrease in the mediastinal shadow.

The writer wishes to thank Doctor Crane of Berkeley for the courtesy of letting him report this case. Dr. Charles McVey and Doctor Glenn of Oakland also gave valuable assistance.

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DISCUSSION

ROBERT A. GLENN, M. D. (The Samuel Merritt Hospital, Oakland).—One's first impression on observing this fluid was its apparent intensely purulent, hemorrhagic nature, yet it was free-flowing and exhibited no sedimentation. Our immediate suspicion of chylous effusion was made certain by microscopic and chemical study, as stated in the paper. Subsequent observations of fluid from the same case verified the original diagnosis. In the absence of any history of trauma one is inclined to believe in the probability of pressure exerted on the thoracic duct causing the effusion of chyle. The fact that one exposure to deep x-ray therapy was followed by an intense general reaction and a subsidence of the fluid level seems to support the opinion of the presence of a tumor, probably lymphomatous in nature, pressing on the duct. However, the history given in the paper of digestive disturbances, gaseous distention, etc., followed by a sudden onset of excruciating pain in the region of the epigastrium may indicate some acute disaster of an entirely different nature.

We have had the opportunity to observe this patient occasionally during the past year and he reports himself in excellent condition, without any respiratory distress, and attending his medical practice as usual.

❦

ROBERT S. STONE, M. D. (University of California Hospital, San Francisco). — Doctor Van Nuys has presented to us a very unusual case in a very interesting manner. Naturally, from the fact that he could find only sixty-six cases reported few, if any of us, will have had personal experience with this condition. It is therefore, of especial value to us to have Doctor Van Nuys share his experience with us.

The only point that I can make in a discussion of this report is to call the attention of the medical profession to the necessity for close coöperation between the roentgenologist and the physician referring the patient. Undoubtedly the x-ray appearance of this chest would suggest nothing more than an ordinary case of pleural effusion, but the roentgenologist being a trained physician was able, because of his medical training, to help interpret the x-ray findings in the light of the clinical findings. The day has gone by when the x-ray film should be used as a puzzle picture to the roentgenologist, put up by the physician with the spirit of tell me what is the matter with the patient from the film. This case of chylothorax reported by Doctor Van Nuys is an excellent example of just this point.

THE LURE OF MEDICAL HISTORY

GALEN: GREEK, MEDIEVALIST AND MODERN*

PART I

By SANFORD V. LARKEY, M. D.
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WHILE Galen's reputation rests largely on the nature of his authority in the Middle Ages and the resultant action to it brought about by the discoveries of Vesalius and Harvey, it should be pointed out that there are certain phases of his work, especially in experimental physiology, which bring him into much closer accord with modern science than is usually thought. I shall try to point out the philosophical trend of his thinking which so profoundly influenced medieval scholars, and, in contrast, will describe some of his experiments and his treatment of patients.

Galen was born in Pergamos, Asia Minor, in about 131 A. D., so this year is the eighteen hundredth anniversary of his birth. He was essentially Greek in his mode of thought, this in contrast to the more practical Romans, whose scientific achievements were best exemplified in their great aqueducts, baths, sewers, etc. His father, Nikon, an eminent architect, gave his son an excellent education, philosophical in nature. After the god Aesculapius had appeared to his father in a dream, he decided to study medicine and traveled widely. Among other places he visited Corinth and Alexandria, the latter the great medical center of his time, where there was a knowledge of human dissection. His own later work was done entirely on animals, and this accounts for many errors in his descriptions.

After serving as physician to the gladiators in his home city, he came to Rome where he achieved a great reputation, but due to the jealousy of his fellow practitioners he was forced to flee for his life. However, the emperor Marcus Aurelius recalled him to be court physician and tutor to his son Commodus. After a life of tremendous activity and amazing literary productivity, he died in 201.

Galen's particular genius consisted in correctly appreciating the essential features of his scientific inheritance. In a welter of conflicting ideas and theories, he based his medicine on Hippocrates and his biology on Aristotle. Thus he brought together the best elements in Greek medicine, an essential step in scientific progress. This systemization carried great weight in the Middle Ages, but it took along with it many fanciful speculations, which were considered equally authoritative. and which were not tested by experiment. In fact the method of experimental verification, urged but not always practiced by Aristotle and

* From the department of medical history and bibliography, University of California Medical School.

* Read before the Alameda County Medical Society, February 16, 1931.

Galen, seems to have been forgotten and some of Galen's best work was overlooked.

Aristotle had said "Nature makes nothing in vain," and much of Galen's work is colored by this teleological point of view. He attempts to show the purposeful design of an omniscient creator. This is well illustrated in the introduction to his "The Use of Parts."

"This work is a veritable hymn which I compose to the power that made us. And I hold it to be true piety, not that I should sacrifice to him innumerable hecatombs of oxen, nor burn abundance of myrrh and cassia, but that I should first myself realise, and then show to others how wise he is, how powerful, and how good. For his wish to bring the whole cosmos into order and to debar no one from its benefits—this I hold a proof of his absolute goodness; for this, then, let us praise him as good."

* * *

"The foot is a small and modest portion of the animal—who will deny it? The sun is great; it is finer than anything else in the universe; this, too, we know. Consider, however, this: Where ought the sun to have been stationed in all the universe, and where the foot in the animal? The sun ought to have been placed midmost among the wandering stars in the universe, and the foot lowest of all things in the body." [1]

It can easily be seen how acceptable this must have been to medieval theologians. It all fitted in so perfectly with the ideas of Catholic Christianity.*

Another speculation which had a great influence was his doctrine of the "spirits," or the function of the blood. Food was digested in the stomach and the chyle carried to the liver. Here it was "concocted" or elaborated into the "Natural Spirits." The blood containing this ebbed and flowed in the venous system and served for the nourishment of the tissues. It also entered the right side of the heart and was carried to the lungs, the purpose of which was to cool the blood and rid it of waste vapors. There was no conception of a circulation through the lungs. Some of the inspired air, the "pneuma," was carried to the left side of the heart, a small portion of the blood in the right ventricle seeped through minute orifices in the septum into the left ventricle. Here it became rarefied and elaborated by contact with the "pneuma" into the "vital spirits." This ebbed and flowed in the arterial system and was necessary for the life of the tissues. This arterial blood going to the brain was again converted into a third, the "animal spirits," which flowed in the nerves and which were necessary for movement. This was the physiological system which dominated until the time of Servetus and Harvey.

Appendix

Since Galen's great teleological work, "The Use of Parts," has never been translated into English, the following a translation of the first five chapters of this from Daremberg's French edition may be interesting.

* See, also, the appendix.

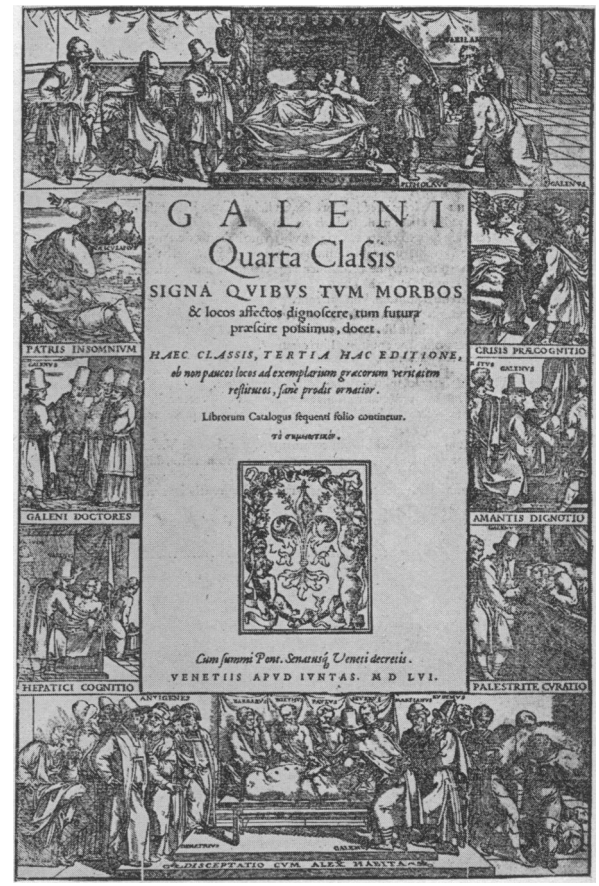

Fig. 1.—The title page of the Junta edition of Galen, 1556. (From a copy owned by Dr. Chauncey Leake.)

"The Use of Parts"
Translated from the French of Charles Daremberg by Geraldine G. Larkey

Chapter I

It is said that every animal is a *unit* because it appears to have a certain real circumscription and because it has no junction with other animals. In the same way it is said that each part of the animal, for example, the eye, the nose, the tongue, the hair is a *unit,* provided it also appears to have real circumscription. If these parts were not attached on several sides to that which they bordered, and if, on the contrary, they were completely isolated, then they would not be *parts* at all, but simply *units.* So that any body which has not a real circumscription, but which also is not united on all sides to that which surrounds it, is called a part. If this is true, there would be many parts in animals, some larger, some smaller, and finally some which are absolutely indivisible into other kinds.

Chapter II

The use of all these parts is dependent on the soul, for the body is the instrument of the soul. Moreover, the same parts differ widely from each other among the different animals because the souls themselves differ. Thus there are strong souls, there are cowardly, savage and subdued souls; others, so to speak, are civilized and capa-

ble of directing various affairs; others have solitary tastes. Among all, then, the body is accommodated to the habits and to the faculties of the soul. In the case of the horse the body is provided with strong hoofs and a mane, for it is a swift, faithful animal, and not without courage. With the lion, a valiant and bold animal, the body derives its force from teeth and claws. It is the same with the bull and wild boar; with the former, horns, with the latter prominent teeth (defense) are the natural weapons. With the stag and the hare (cowardly animals), the body is able to run quickly, but is absolutely bare and disarmed. It is in fact appropriate, it seems to me, to give speed to cowardly animals and weapons to brave animals. Thus nature has neither armed the cowardly nor disarmed the courageous. To man, animal gifted with wisdom and the only divine being among those which live on earth, she has given for his entire defensive weapon, the hands. An instrument necessary to carry out every kind of industry and no less useful in times of peace than in times of war. There was no need, then, of giving a natural horn to this one, which at its will could construct with hands an instrument better than a horn; for the sword and the lance are both better and more suitable weapons for cutting than any kind of hoof. Moreover, with the horn and hoof one can do nothing without getting close to one's adversary, while the weapons of man are as effective from a distance as close to; the javelin and the arrow better than the horn, stone and wood better than the hoof. But the lion is more swift than man. What does that matter since man, by his wisdom and his hands, has mastered the horse, which is swifter than the lion and which he uses in fleeing from or following this animal. From the height of this horse on which he is mounted man can strike the lion which is on foot. Thus man is neither bare, nor without weapons, nor easily vulnerable, nor without swiftness, but where he so wishes, a cuirass of iron becomes for him a means of protection more invulnerable than any kind of skin. He can also have shoes, clothes and weapons of every kind. It is not only his armor, but also his horse, his wall and his towers which shelter man. If he had a horn or any other kind of defensive weapon naturally attached to his two hands, he would not be able to use his hands either for building houses and towers or for constructing a lance or an armor, or any other similar article. With his hands man weaves a coat, interlaces the mesh of a net, completes a weir, a thread, a network. Consequently he is master not only of the animals which live on land, but of those which live in the sea or in the air. Such is the weapon which man finds in his hands to defend himself. But man, made for peace as well as for war, uses his hands for writing laws, raising altars and statues to the gods, constructing a ship, fashioning a flute, a lyre, making a knife, a pair of tongs, producing instruments for all the arts. In his writings he leaves memoirs on the theoretical side of these arts so that, thanks to written works and the use of the hands, you can still be in contact with Plato, Aristotle, Hippocrates, and the other ancients.

Fig. 2.—Æsculapius appearing in a dream to **Galen's Father.**

Chapter III

Thus man is the wisest of all animals. Thus the hands are an instrument suitable to a wise being, for man is not the wisest of animals because he has hands, as Anaxagoras claimed, but he has hands because he is the wisest, as Aristotle (who judges very discerningly) set forth. In fact it is not by his hands, but by his reason that man has learned the arts. The hands are an instrument, just as the lyre is an instrument for the musician, and the tongs for the blacksmith. However, the lyre has not created the musician nor the tongs the blacksmith, but each is an artist because of the intelligence with which he has been endowed, and he cannot exercise his art without instruments. In the same way every soul is endowed, by virtue of its essence, with certain faculties. But it is impossible for it to carry out that to which nature has destined it, if it is deprived of instruments. It is obviously seen in observing new-born animals who try to act before their parts are entirely formed, that the parts of the body do not excite the soul to be cowardly, courageous, or intelligent. Thus I have often seen a calf hit about with its head before its horns are developed; a colt kick, although its hoofs are still soft, and a tiny pig defend itself with its snout, destitute of its big teeth. Finally, a little dog tries to chew with its teeth still tender, for every animal has in it, without having been taught, the feeling of the faculties of his soul and

of the power of the parts of his body. Why, then, does the little pig, being able to chew with his teeth, not use them in combat while he tries instead to use what he has not yet got? How can it be said that animals learn from the parts themselves the manner of using them since before possessing these parts they already know the destination of them? Take, then, three eggs, one of an eagle, one of a duck, one of a snake. Warm them moderately yourself and break the shell. You will see among the animals which you have hatched that two will try to use their wings before being able to fly, that the other will crawl, although it is still soft and powerless to do it. And if, after having raised them in the same house, you carry them into the open air and give them their liberty, the eagle will rise into the air, the duck will fly to some mire, and the snake will hide itself in the ground. Finally, I think it is not because of having been taught that the eagle will hunt, the duck will swim, and the snake will cower in a hole for, following the word of Hippocrates, "The natures of animals do not receive instruction." From which it seems to me, moreover, that animals exercise certain arts, more by instinct than by reason. Thus one sees the bees construct hives, the ants dig themselves sort of cellars and underground passages, and the spiders weave and spin their webs, and without, I imagine, having had any masters.

Chapter IV

Man, in the same way that he has a body deprived of weapons, has also a soul destitute of skill. That is why he has been given hands and reason to compensate for the bareness of his body and the absence of skill in his soul. Using, then, his hands and his reason, he arms and protects his body in every way, he adorns his soul with all the arts, for, if he had possessed a natural weapon, he would still have had only that, and in the same way, if he had known any art naturally, he would not possess others. As it was better to employ all the weapons and exercise all the arts, man did not receive any from nature. Aristotle has well said, that the hand in some ways is a positive instrument which takes the place of other instruments. By imitating Aristotle, we could also very well contend that reason is a positive art, which takes the place of other arts. In fact, as the hand, not being any of the particular instruments, takes the place of all the instruments (since it can very well construct them all), so the reason, which is not any particular art, since it is capable of receiving them all, would be an art which takes the place of arts. Man, then, being of all the animals the only one which possesses in his soul an art which takes the place of arts, consequently enjoys in his body an instrument which takes the place of instruments.

Chapter V

Let us examine at first this part of man (that is to say, the hand) and let us see not only if it is simply useful, or if it is suited to an animal endowed with wisdom, but if it is, in all its details, a structure such as could not be improved upon if it were constructed in some other way. The first and most important requirement which an instrument of prehension should fulfill, in order to be a perfect construction, is to always be able to pick up easily any objects that man needs to move, whatever form or whatever size it might be. Is it, then, more advantageous for the hand to be divided into parts of diverse forms, or for it to be made of a single piece? There is certainly no need of long explanations to show that the hand, if it were undivided, could not touch the bodies with which it would come in contact, except on a surface equal to its actual width. But, divided into several parts, it can easily embrace objects much more voluminous than itself, and can catch perfectly the smaller objects. When it seizes voluminous articles it increases its span by stretching the fingers, and with small things it does not try to take them with the whole hand, for these objects would escape it, but it suffices to use the ends of two fingers. The hand, then, is the most perfect structure with which to seize firmly small things as well as large. And finally, it is very fortunate that the hand was divided into parts of divers form in order to grasp articles of various shapes. Now, in order to accomplish this end, the hand is evidently the best constructed of all the instruments of prehension. For spherical objects, it can put itself in a round shape and embrace them circularly on all sides. With the same certainty it can seize flat bodies, and those which are

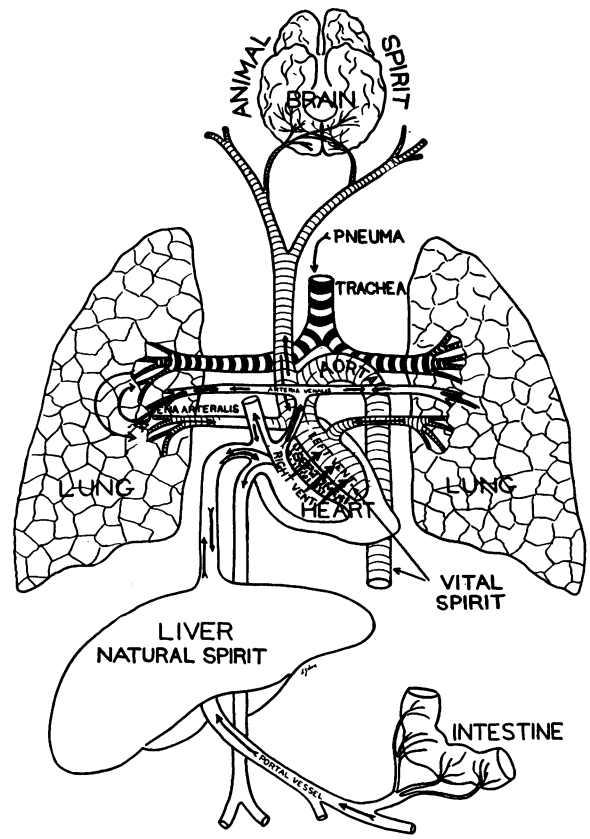

Fig. 3.—A diagram showing Galen's theory of the "spirits."

hollow. In the latter case it adapts itself to all the forms, since all the forms result from a combination of three kinds of lines—convex, concave, or straight. Since many bodies are too large to allow one hand to be sufficient, nature has made one the auxiliary of the other, in such a way that both, seizing the voluminous object by two sides, do not leave the task to one hand, which would be very difficult. The hands, consequently, have been turned opposite to each other, for they were made for each other, and they have been constructed absolutely alike. That was a very suitable thing for organs which must act in the same way. After you have considered the largest objects man is called upon to move with his two hands, such as wood and stone, turn your thoughts immediately toward the tiniest objects, such as a grain of millet, the thinnest of thorns, a hair; then think of the multitudinous degrees of volume between the largest and the smallest, and reflect on all that. You will find that man manages all these things so well, that it will seem to you that the hands have been made expressly for each one of these articles separately. In fact, with small objects, one seizes them with the ends of two fingers, the thumb and the index. Objects a little larger are taken with the same two fingers, but not with the ends of them. With objects still more voluminous three fingers are used, the thumb, the index, and the middle. For those which are still larger, four fingers are put to work, then the five, then the whole hand. Then the second hand is added for objects still more voluminous. The hand could not fulfill any of these tasks were it not divided into parts of divers form. But it does not suffice that the hand should simply be divided into fingers: in fact, of what use would that be, if one of the five fingers had not been opposite the four others as it is, and if all had been placed in the same row beside each other? Is it not evident that the number of the fingers would become useless? For, in order to be firmly held, every body must be seized around all sides, or at least by two opposite points. This advantage might have been lost if the five fingers had been ranged on the same line with each other; but in the actual state of things it is preserved, one of the fingers being able to be opposite the others, for this finger is placed and moves in such a way that by means of a very limited movement of rotation it is able to act in accord with the other fingers to which it is opposed. As it was best that the hands should be able to fulfill the functions which they now fulfill, nature has given them a structure which renders them apt to these operations.

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MASTERS IN MEDICINE

WILLIAM HENRY WELCH AT EIGHTY

"WILLIAM HENRY WELCH AT EIGHTY" is the title of a volume published by the Milbank Memorial Fund of New York, in commemoration of the celebration of the eightieth birthday of Dr. William Henry Welch of Johns Hopkins University.

From this memorial record of celebrations have been taken excerpts, which here follow. If there be a member of the medical profession in the United States to whom the honor "dean of the medical profession of America" could be most aptly applied, the man selected would in all probability be Welch of Johns Hopkins. The excerpts here given should, therefore, be of interest to all who have not been fortunate enough to have access to the complete volume of memorial addresses.

FROM THE FOREWORD BY JOHN A. KINGSBURY

For his fine courage and rare ability to pursue truth into its innermost fastness, his broad vision of scientific conquests for the practical benefit of humanity, his warm zeal for discovering and developing the strength of others crusading for health, his charming genius for friendship, and his modesty, marked as his greatness, Dr. William Henry Welch has long been the recipient of cumulating honors and felicitations. When he reached the age of eighty, on April 8, 1930, it was but natural that the legions of his followers, colleagues, personal friends, and unknown admirers should pay their tributes more abundantly than ever before.

Certain associates and friends of Doctor Welch had seen in advance that the occasion of his eightieth birthday would demand some organization for the acclaim which was sure to arise from all sides. . . . . . The coöperation of Doctor Welch himself had to be secured, in order to obtain necessary information, and to arrange for his presence at certain of the gatherings. With characteristic modesty he contended that he was merely a figure in the great cause of modern medicine, which had been advanced by many leaders working together. The committee turned the contention back upon Doctor Welch and induced him to accept the tributes as a representative of that movement.

This book is published as a memorial record, even though necessarily incomplete, of the celebrations in honor of the eightieth birthday of Doctor Welch. . . . . . In publishing this volume for the Executive Committee, which served in organizing the celebrations, the Milbank Memorial Fund honors Doctor Welch, who is the chairman of its Advisory Council, and at the same time aims to perpetuate an ideal in the domain of its principal interest, public health, where, as President Hoover said, "Doctor Welch is out greatest statesman."

FROM THE DEDICATORY PAGE OF THE VOLUME

WILLIAM HENRY WELCH

To have stepped, in the prime of life, into a position of acknowledged intellectual leadership in the profession of his choice; to have occupied that position, albeit unconsciously, for those forty years which have seen the most rapid strides in medical progress of all time; to have had such influence in the furtherance of the medical sciences in this country as to turn the tide of students seeking opportunities for higher education from the old world to the new; to have been as ready in countless unrecorded ways to share his time and thought with those who were inconspicuous as with those who sat in high places; to have been no less universally respected for his great learning than beloved for his personal